ATTACHMENT I – ITEMS TO BE INCLUDED IN A MONITORING WELL INSTALLATION WORKPLAN AND A MONITORING WELL INSTALLATION REPORT OF RESULTS

Prior to installation of groundwater monitoring wells, the Discharger shall submit a workplan containing the minimum listed information. Wells may be installed after staff approves the workplan. Upon installation of the monitoring wells, the Discharger shall submit a report of results, as described below. All workplans and reports must be signed by a registered geologist, certified engineering geologist, or civil engineer registered or certified by the State of California.

SECTION 1 - Monitoring Well Installation Workplan

A. General Information:

- Purpose of well installation project
- Copies of County Well Construction Permits (to be submitted after workplan review)
- Monitoring well locations and rationale
- Survey details
- Equipment decontamination procedures
- Health and safety plan
- Topographic map showing any existing wells, proposed wells, waste handling facilities, utilities, and other major physical and man-made features.

B. Drilling Details:

- Describe drilling technique
- Sampling intervals, and logging methods
- Cuttings storage and disposal

C. Monitoring Well Design:

- Casing diameter and centralizer spacing (if needed)
- Borehole diameter
- Depth of surface seal
- Well construction materials
- Diagram of proposed well construction details
- Type of well cap, bottom cap either screw on or secured with stainless steel screws
- Size of perforations and rationale
- Grain size of sand pack and rationale
- Thickness and position of bentonite seal and sand pack
- Depth of well, length and position of perforated interval

D. Well Development:

- Require a minimum of 48 hours prior to development activities
- Method of development to be used
- Method of determining when development is complete
- Parameters to be monitored during development
- Method of development water storage and disposal

E. Well Survey:
- Identify the Licensed Land Surveyor or Civil Engineer that will perform the survey
- Describe what well features will be surveyed (i.e. top of casing, horizontal and vertical coordinates, etc.)
- Vertical accuracy shall be to at least 0.01 foot

F. Soil Sampling (if applicable):
- Analyses to be run and methods
- Sample containers, collection method, and preservation method
- Table describing sample volumes, sample containers, preservation agents, and hold times
- Intervals at which soil samples are to be collected
- Number of soil samples to be analyzed and rationale
- Location of soil samples and rationale
- QA/QC procedures

G. Well Sampling:
- Minimum time after development before sampling (48 hours)
- Well purging method and amount of purge water
- Sample containers, collection method, and preservation method
- Table describing sample volumes, sample containers, preservation agents, and hold times
- QA/QC procedures

H. Water Level Measurement:
- The elevation reference point at each monitoring well shall be within 0.01 foot. Ground
- surface elevation at each monitoring well shall be within 0.01 foot. Method and time of water
- level measurement shall be specified.

I. Proposed time schedule for work.

SECTION 2 – Groundwater Sampling and Analysis Plan

A. General Information:
- Purpose of well sampling
- Site Location
- Monitoring well locations
- Monitoring well construction details including elevation, well depth, casing material and size, and screen interval
- Equipment decontamination procedures
- Health and safety plan
- Topographic map showing any existing wells, proposed wells, waste handling facilities, utilities, and other major physical and man-made features.

B. Water Level Measurement:
- Ground surface elevation at each monitoring well shall be within 0.01 foot.
- Method and time of water level measurement shall be specified
- Water level in well shall be allowed to equilibrate prior to measuring the depth to water

C. Well Sampling:
- Well purging method and amount of purge water, purge water storage
- Sample containers, collection method, and preservation method
- Table describing sample volumes, sample containers, preservation agents, and hold times
- Identification of analytical laboratory
- Chain of custody procedures
- QA/QC procedures

D. Proposed time schedule for work.

SECTION 3 - Monitoring Well Installation Report of Results

A. Well Construction:
- Number and depth of wells drilled
- Date(s) wells drilled and completed
- Description of drilling and construction
- Locations relative to facility features such as buildings, storage ponds, waste piles, etc.
- A well construction diagram for each well must be included in the report, and should contain the following details:

  Drilling Contractor and driller name
  Depth of open hole (same as total depth drilled if no caving occurs)
  Method and materials of grouting excess borehole
  Footage of hole collapsed
  Length of slotted casing installed
  Depth of bottom of casing
  Depth to top of sand pack
  Thickness of sand pack
  Depth to top of bentonite seal
  Thickness of bentonite seal
  Thickness of concrete grout
  Boring diameter
  Casing diameter
  Casing material
  Size of perforations
  Number of bags of sand
  Well elevation at top of casing
  Depth to ground water
  Date of water level measurement
  Monitoring well number
  Date drilled
  Location

B. Well Development:
- Date(s) of development of each well
- Method of development

- Volume of water purged from well
- How well development completion was determined
- Method of effluent disposal
- Field notes from well development should be included in report.

C. Well Survey:
- Identify the coordinate system or reference points
- Survey the well casing will the cap removed (horizontal and vertical coordinates)
- Include the Registered Engineer or Licensed Surveyor's report and field notes in appendix
- Describe the measuring points (i.e. ground surface, top of casing, etc.)
- Present the well survey report data in a table

D. Water Sampling:
- Date(s) of sampling
- How well was purged
- How many well volumes purged
- Levels of temperature, EC, and pH at stabilization
- Sample collection, handling, and preservation methods
- Sample identification
- Analytical methods used
- Laboratory analytical data sheets
- Water level elevation(s)
- Groundwater contour map

E. Soil Sampling (if applicable):
- Date(s) of sampling
- Sample collection, handling, and preservation method
- Sample identification
- Analytical methods used
- Laboratory analytical data sheets